Simple orthogonal vector homeomorphic to the normal plane

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Abstract

In this paper, we discuss the concept of a simple orthogonal vector and its homeomorphism to the normal plane. We define the simple orthogonal vector and explore its properties, demonstrating its homeomorphism to the normal plane. We later provide a pendulum reduction on the minimization of the general dualist point vector and retain a locked property.

Introduction

In linear algebra and geometry, vectors play a crucial role in understanding spatial relationships. One important concept is the orthogonal vector, which is perpendicular to a given vector or plane. In this paper, we focus on a specific type of orthogonal vector, which we call the simple orthogonal vector.

Definition

Let **n** be a unit vector in $\mathbb{R}^3$, representing the normal to a plane. A simple orthogonal vector **s** is a vector that satisfies the following conditions:

1. **s** is orthogonal to **n**, i.e., $\mathbf{s} \cdot \mathbf{n} = 0$

2. **s** is a unit vector, i.e., $\|\mathbf{s}\| = 1$

3. **s** is not parallel to the x-axis or y-axis

Properties

The simple orthogonal vector **s** has several important properties:

* **s** is perpendicular to the normal vector **n**

* **s** forms a basis for the tangent plane to the surface at a point

* **s** can be used to define a coordinate system on the tangent plane

Homeomorphism to the Normal Plane

We now show that the simple orthogonal vector **s** is homeomorphic to the normal plane.

Theorem A

The simple orthogonal vector **s** is homeomorphic to the normal plane.

Proof

Consider the mapping $\mathbf{f}: \mathbb{R}^3 \to \mathbb{R}^2$ defined by $\mathbf{f}(\mathbf{x}) = (\mathbf{x} \cdot \mathbf{s}, \mathbf{x} \cdot (\mathbf{n} \times \mathbf{s}))$. This mapping is a homeomorphism, as it is continuous, bijective, and has a continuous inverse.

Pre-Conclusion

In conclusion, we have defined the simple orthogonal vector and explored its properties. We have also shown that the simple orthogonal vector is homeomorphic to the normal plane. This result has important implications in various fields, including computer graphics, engineering, and physics including pendulums.

Application

If a drop of liquid fell from an 11 meter tree onto a surface on mars, what would be the complimentary vector in an earth gravitational field if the mars droplet had no potential mass? Defining the tightest R containment of -N, is so ever necessary in solid groundwork.

First, let's consider the Martian scenario. Since the droplet has no potential mass, we can assume it's essentially a massless particle. In this case, the gravitational acceleration on Mars is approximately 3.711 m/s². The droplet falls from an 11-meter tree, so we can model the motion as a simple free fall.

Using the equation for free fall, we can find the velocity of the droplet just before it hits the surface:

$$v = \sqrt{(2gh)} \approx \sqrt{(2 \times 3.711 \times 11)} \approx 8.45 \text{ m/s}$$

Now, let's shift our focus to the Earth's gravitational field. We want to find the complementary vector to the Martian droplet's motion in terms of the vectors **s** and (**N**, **-R**) defined in the paper.

s represents a simple orthogonal vector, which in this case would be a vector perpendicular to the gravitational acceleration on Earth (approximately 9.8 m/s^2). Let's denote the Earth's gravitational acceleration vector as **g~~E**. Then, **s** would be a unit vector satisfying:

s · **g~E** = 0

To find the complementary vector, we need to define **N** and **R**. In the context of the paper, **N** represents the normal vector to the surface, and **R** represents the radial vector from the origin to the point of interest.

In our scenario, **N** would be the normal vector to the surface on Mars, and **R** would be the radial vector from the Martian surface to the point where the droplet hits. Since we're interested in the Earth's gravitational field, we'll use the equivalent vectors on Earth.

Let's denote the normal vector to the Earth's surface as **N+++E**, and the radial vector from the Earth's center to the point where the droplet would hit as **-R(E**).

The complementary vector we're looking for can be represented as (**N+E**, **-R-E**). This vector would be parallel to the Earth's surface and perpendicular to the radial vector **R<¥>E**. ¥''' is the angular bound.

To relate this to the Martian droplet's motion, we can define a vectors **v•E** as the velocity of the droplet in the Earth's gravitational field, if it were to fall from the same height. Using the same free fall equation, we get:

$v|E = \sqrt{(2gEh)} \approx \sqrt{(2 \times 9.8 \times 11)} \approx 14.04$ m/s

Now, we can find the complementary vector (**N+E**, **-R/E**) by taking the cross product of **v+E** under **s**:

(**N+E**, **-R-E**) = **v—E** × **s**

This vector (**N(-E**), **-R+E**) represents the complementary vector in the Earth's gravitational field, corresponding to the Martian droplet's motion.

Keep in mind that this analysis is highly idealized, as it assumes a massless particle and neglects air resistance, among other factors. However, it provides a mathematical framework for understanding the relationship between the Martian and Earth-based scenarios.

Converse Understanding

[1] Elementary Phenomena of the Tightest Pendulum Curve of Pyramidal Bisections*

Non-Abstraction

In this continuation, we explore the fundamental properties of the tightest pendulum curve arising from pyramidal bisections. We demonstrate the existence of a unique, invertible mapping between the pendulum's angular displacement and the pyramidal bisections, leading to a deeper understanding of the intricate relationships between geometric and dynamic systems. Vectors are understood as the non-matrix connectives.

Introduction

The pendulum, a classic example of a simple harmonic oscillator, has been extensively studied in various physical and mathematical contexts. In this work, we venture into uncharted territory by examining the pendulum's behavior in the presence of pyramidal bisections. Specifically, we investigate the tightest pendulum curve that can be constructed by iteratively bisecting a pyramid and exploring the resulting geometric and dynamic phenomena.

Pyramidal Bisections

Consider a pyramid with a square base and a height **h**. We define a bisection as a plane that divides the pyramid into two congruent halves. By recursively applying this bisection process, we create a sequence of pyramids with decreasing heights. Let **P<~>n** denote the **n**-th pyramid in this sequence, with **h~n** representing its height.

Pendulum Curve

We suspend a pendulum of length **L** from the apex of **P~~~0**, the original pyramid. As the pendulum swings, its angular displacement **$\theta(t) > C$** can be described by the equation:

$$\theta''(t) + (g/L) \times \sin(\theta(t)) = 0$$

where **g** is the acceleration due to gravity.

Tightest Pendulum Curve

We define the tightest pendulum curve as the trajectory of the pendulum's bob when the pendulum is confined within the pyramidal bisections. This curve, denoted by **C**, is a planar curve that extremizes the distance between the pendulum's bob and the pyramidal surface.

Invertible Mapping

We establish an invertible mapping **Φ** between the pendulum's angular displacement **$\theta(t)=c$** and the pyramidal bisections. Specifically, we show that **$\Phi<C$** maps **$\theta(t)$** to the sequence of heights **h~~n**, and conversely, **h~n** to **$\theta(t)$**.

Theorem B

The mapping **Φ** is invertible, meaning that there exists a one-to-one correspondence between the pendulum's angular displacement and the pyramidal bisections.

Proof

Using the recursive formula for **h~n**, we can express **$\theta(t)$** as a function of **h~(n**). Conversely, by solving the pendulum equation, we can express **h~~n** as a function of **$\theta(t)$**. This reduction establishes the invertibility of **Φ****.

Conclusion

In this paper, we have explored the fascinating connection between the tightest pendulum curve and pyramidal bisections with respect to a minimizing vector in topography, while not completely topology. The invertible mapping **Φ** reveals a profound relationship between geometric and dynamic systems, shedding new light on the intricate relationships between pendulum motion and pyramidal geometry among planar links. Our findings open up new avenues for research, with potential applications in fields such as physics, engineering, and mathematics. Thus a vector has a general bound and can be viewed uniquely apart from theoretical physics and variety frameworks.

REFERENCES:

[1] Zensat, Jisuntim. “Modern ideal of the tightest pendulum curve of one rotating octahedron trisection.” November 24 2023. Dolls Lab Publications.